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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,062	07/08/2003	Hyug-Jin Kwon	29926/39496	8080

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EXAMINER	
MACARTHUR, SYLVIA	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 06/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/615,062	KWON, HYUG-JIN	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 July 2003* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/8/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: Delete the second occurrence of "reaction" in line 3. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 and 6- 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (applicant's admitted prior art, specifically Fig. 3A) in view of Kojima et al (US 5,766,498).

Regarding claim 1: AAPA teaches a reaction chamber having a predetermined volume constituted with an upper plate 31A, lower plate 31B, and sidewalls 31C, see Fig. 3A; a rotating plate 35 loaded with a plurality of wafers, and a heating plate 33.

AAPA fails to teach a) a cooling plate attached to an upper surface of the upper plate

b) a plasma excitement electrode at the entrance of the showerhead and between the cooling plate and the showerhead.

Kojima et al teaches a showerhead electrode 3 detachable arranged at the lower end portion of cooling block 23. More specifically, the showerhead electrode comprise an electrode 54 and a cooling plate 53. The showerhead electrode is connected to an RF power supply 12. See col.3 liens 55-col.4 line 12. According to col. 5 lines 43-52, showerhead is a radial showerhead.

The motivation to modify the apparatus of AAPA is that the apparatus of Kojima et al offers a) a radial showerhead which enhances the distribution of gas entering the chamber b) a cooling plate near the showerhead to maintain and control the temperature of the inlet gases and c) an electrode which is coupled to the showerhead so that the inlet gases assist in plasma generation. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to combine the teachings of AAPA and Kojima et al.

Regarding claim 6: A distance is illustrated between the showerhead and the rotating plate. However, the AAPA fails to specifically teach that the distance is 3.5 mm to about 7 mm. According to In re Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. Thus, it would have been obvious for one of ordinary skill in the art to modify the apparatus of AAPA modified by Kojima et al to provide a distance of 3.5 mm to 7 mm between the showerhead and the rotating plate in order to provide ample spacing for the cultivation of plasma and thus promote the optimal deposition layer.

Regarding claim 7: AAPA chamber is a ALD chamber, Thus, an atomic layer is deposited onto a wafer. In order to clean the chamber, chlorine gas is used to clean line 32A and

Ar gas is used to prevent deposition of process gas onto the underside surface of the rotating plate. See page 6 lines 4-15 of the specification.

Regarding claim 8: Col. 4 lines 45-52 teaches that the power level of the RF supply is about 50 to 3000 W. The amount of power supplied to the electrode is an optimizable processing parameter. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the amount of power to the electrode that generates the optimal plasma for the ALD or cleaning process.

Regarding claim 9: The cleaning gas is a mixture of chlorine gas and argon gas, however each gas is injected separately as illustrates in Fig. 3A, see specification page 6 lines 3-15.

4. Claims 2,3,10,12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Kojima et al as applied to claims 1 and 6-9 above, and further in view of Satou et al (US 4,676,194).

The teachings of AAPA modified by Kojima et al were discussed above.

Regarding claims 2 and 10: AAPA modified by Kojima et al fails to teach an ion extraction electrode.

Satou et al teaches an apparatus for thin film formation. An ion extraction electrode 25 is provided at the exhaust of the gas introduction tube 22. The motivation to provide the ion extraction tube is for extracting ions generated in the plasma generating zone into the accelerating zone 19, see col. 3 lines 60-65. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide

an ion extraction electrode in the apparatus that results from the combined teachings of AAPA in view of Kojima et al.

Regarding claim 3: Col.4 lines 15 and 16 teaches that the ion extraction electrode uses a DC power supply 30.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Kojima et al as applied to claims 1 and 6-9 above, and further in view of Dunham (US 6,626,998).

The teachings of AAPA modified by Kojima et al were discussed above.

AAPA modified by Kojima et al fails to teach that the plasma excitation electrode is constructed in a ring-type structure.

Dunham teaches a plasma generator. The abstract cites that the showerhead comprises an electrode ring 37. The motivation to provide the apparatus of AAPA modified by Kojima et al is that it requires minimum metal from metal insulation procedures and yet generate and maintain uniform charged plasma. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a ring-shaped electrode near the showerhead to enhance plasma generation.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Kojima et al as applied to claims 1 and 6-9 above, and further in view of Mena (US 5,518,572).

The teachings of AAPA modified by Kojima et al is discussed above.

AAPA modified by Kojima et al fails to teach that the exhaust of the radial showerhead head has an angle.

Mena teaches a plasma processing system and method. The method teaches an ion extraction electrode 218 and 22 wherein the power supplied to them is –50V and –80V respectively, see col. 20 lines 58-64. The amount of voltage supplied to the electrode is an optimizable processing parameter. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the amount of voltage to the electrode that generates the optimal plasma for the ALD or cleaning process.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the core hours of 9 a.m. and 3 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sylvia R MacArthur
Patent Examiner
Art Unit 1763

June 10, 2005